METHOD AND APPARATUS FOR SOLVING AN INEQUALITY CONSTRAINED GLOBAL OPTIMIZATION PROBLEM

ABSTRACT

One embodiment of the present invention provides a system that solves a global inequality constrained optimization problem specified by a function f and a set of inequality constraints $p_i(\mathbf{x}) \leq 0$ $(i=1,...,m)$, wherein f and p_i are scalar functions of a vector $\mathbf{x} = (x_1, x_2, x_3, ... x_n)$. During operation, the system receives a representation of the function f and the set of inequality constraints, and stores the representation in a memory within the computer system. Next, the system performs an interval inequality constrained global optimization process to compute guaranteed bounds on a globally minimum value of the function $f(\mathbf{x})$ subject to the set of inequality constraints. During this process, the system applies term consistency to a set of relations associated with the global inequality constrained optimization problem over a subbox $\mathbf{X}$, and excludes any portion of the subbox $\mathbf{X}$ that violates the set of relations. The system also applies box consistency to the set of relations, and excludes any portion of the subbox $\mathbf{X}$ that violates the set of relations. The system also performs an interval Newton step on the subbox $\mathbf{X}$ to produce a resulting subbox $\mathbf{Y}$. The system integrates the subparts of the process with branch tests designed to increase the overall speed of the process.

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